

IN THE CLAIMS:

1. (Withdrawn) A transmitting device of a radio communication system having a radio link control layer, comprising:

a segmentation and/or concatenation module that segments and/or concatenates service data units (SDUs) received from an upper layer through an access point (AP) for forming at least one protocol data unit (PDU);

a header adding module that adds at least one header to the segmented and/or concatenated SDUs for forming the at least one PDU;

a data storing module that stores the at least one PDU to which the headers are added; and

a ciphering module that ciphers the at least one PDU and then transmits the result to a lower layer through at least one of a plurality of channels for transmission.

2. (Withdrawn) The transmitting device of claim 1, wherein the AP is a UM-SAP, at least one of the plurality of channels is at least one of DTCH, DCCH, CCCH, SHCCH, or CTCH and the result is transmitted from the transmitting device through at least one lower layer to an RLC entity of the radio communication system corresponding to a receiving side.

3. (Withdrawn) The transmitting device of claim 1, wherein at least one of the plurality of channels is a logical channel.

4. (Withdrawn) The transmitting device of claim 1, wherein the at least one header include a sequence number (SN) representing an order number of the at least one PDU.

5. (Withdrawn) The transmitting device of claim 1, further comprising a data retransmission control module that controls retransmission and in which the at least one PDU to which the at least one header is added by the header adding module is stored for retransmission.

6. (Withdrawn) The transmitting device of claim 5, further comprising a multiplexer that provides either a first output signal from the header adding module or a second output signal from the data retransmission control module to the data storing module.

7. (Withdrawn) The transmitting device of claim 5, further comprising a header field setting module that sets at least one field of the at least one header in the at least one PDU received from the data storing module and transmits the at least one PDU to the ciphering module.

8. (Withdrawn) The transmitting device of claim 5, wherein the access point is an AM-SAP, the at least one ciphered PDU is transmitted to a radio link control entity of the communication system corresponding to a receiving side, and at least one of the channels is at least one of DTCH or DCCH.

9. (Withdrawn) The transmitting device of claim 5, wherein:  
the ciphering module checks a D/C field in the at least one header of the at least one PDU before performing the ciphering; and  
the ciphering module does not cipher control PDU but data PDU including

piggybacked status is ciphered in accordance with a value of the D/C field.

10. (Withdrawn) The transmitting device of claim 5, wherein the ciphering module checks the at least one PDU and then replaces padding in the at least one PDU by at least one piggybacked status PDU if padding exists in the at least one PDU.

11. (Previously Presented) A receiving device of a radio communication system having a radio link control (RLC) layer, comprising:

a deciphering module that decipheres ciphered protocol data units (PDUs) of the RLC layer received from a lower layer of the receiving device through at least one of a plurality of channels;

a data storing module that stores the deciphered PDUs;

a header removing module that removes headers from the deciphered PDUs; and

a reassembly module that reassembles the deciphered PDUs outputted from the header removing module into service data units (SDUs) and then transmits the SDUs to an upper layer through an access point.

12. (Previously Presented) The receiving device of claim 11, wherein the at least one of the plurality of channels is at least one of DTCH, DCCH, CCCH, or SHCCH, the ciphered PDUs are received from a transmitting side and the access point is a UM-SAP.

13. (Previously Presented) The receiving device of claim 11, wherein the headers include sequence numbers (SN) representing order numbers of the PDUs.

14. (Previously Presented) The receiving device of claim 11, further comprising a data retransmission management module that controls retransmission of ciphered PDUs to the data receiving device.

15-17. (Canceled).

18. (Previously Presented) The receiving device of claim 14, wherein the at least one of the plurality of channels is at least one of DCCH or DTCH, and the access point is an AM-SAP.

19. (Previously Presented) The receiving device of claim 18, wherein the deciphering module includes a deciphering block and a demultiplex/routing block that transmits control PDUs received from the lower layer to an RLC control module and transmits data PDUs to the deciphering block.

20. (Previously Presented) The receiving device of claim 19, wherein the demultiplex/routing block checks a D/C field within the PDUs to determine whether the PDUs are control PDUs or data PDUs.

21. (Previously Presented) The receiving device of claim 20, wherein the header removing module extracts piggybacked information from the data PDUs.

22. (Withdrawn) A transmitting device of a radio communication system having a

radio link control layer, comprising:

a data storing module that stores service data units (SDUs) received from an upper layer through an access point;

a segmentation and/or concatenation module segmenting and/or concatenating the stored SDUs for forming at least one protocol data unit (PDU);

a header adding module that adds at least one header to the at least one PDU; and

a ciphering module that ciphers the at least one PDU outputted from the header adding module and then transmits the result to a lower layer through at least one of a plurality of channels for transmission.

23. (Withdrawn) The transmitting device of claim 22, wherein the access point is an UM-SAP, the result is transmitted to a radio link control entity of the radio communication system corresponding to a receiving side and at least one of the plurality of channels is at least of DTCH, DCCH, CCCH, SHCCH, or CTCH.

24. (Canceled).

25. (Withdrawn) The transmitting device of claim 22, wherein the at least one header includes a sequence number (SN) of the at least one PDU.

26-31. (Canceled).

32. (Withdrawn) A method for transmitting data in a radio communication system

having a radio link control (RLC) layer, comprising:

segmenting and/or concatenating service data units (SDUs) received from an upper layer through an access point for forming at least one protocol data unit (PDU);

adding at least one header to the segmented and/or concatenated SDUs to form the at least one PDU;

storing the at least one PDU having the at least one header in a data storing buffer;

ciphering the at least one PDU; and

transmitting the result to a lower layer through at least one of a plurality of channels for transmission.

33. (Withdrawn) The method of claim 32, wherein the access point is an UM-SAP, the result is transmitted to a radio link control entity of the communication system corresponding to a receiving side and at least one of the plurality of channels is at least one of DTCH, DCCH, CCCH, SHCCH, or CTCH.

34. (Canceled).

35. (Withdrawn) The method of claim 32, further comprising storing the at least one PDU to which the at least one header is added as retransmission PDUs and managing retransmission of the at least one stored PDU.

36. (Withdrawn) The method of claim 35, further comprising multiplexing the PDU to which the header is added and a PDU stored for retransmission and transmitting the combined

PDUs to the data storing module.

37. (Withdrawn) The method of claim 35, further comprising setting at least one field of the at least one header in the at least one PDU before the ciphering step.

38. (Previously Presented) A method for receiving data in a radio communication system having a radio link control (RLC) layer, comprising:

deciphering ciphered protocol data units (PDUs) of the RLC layer received from a lower layer through at least one of a plurality of channels;

storing the deciphered PDUs in a data storing buffer as PDUs;

removing headers from the PDUs;

reassembling the PDUs, from which the headers are removed, into service data units (SDUs); and

transmitting the reassembled SDUs to an upper layer through an access point.

39. (Previously Presented) The method of claim 38, wherein the at least one of the plurality of channels is at least one of DTCH, DCCH, CCCH, SHCCH, or CTCH, the ciphered PDUs are sent from a transmitting side, and the access point is an UM-SAP.

40. (Canceled).

41. (Previously Presented) The method of claim 38, further comprising reading the removed headers.

42. (Previously Presented) The method of claim 41, wherein the deciphering step includes transmitting control PDUs an RLC control module and deciphering only data PDUs.

43. (Canceled).

44. (Previously Presented) The method of claim 38, wherein at least one of the plurality of channels is at least one of DCCH or DTCH, and the access point is an AM-SAP.

45. (Withdrawn) A device for a communication system comprising:  
means for deciphering ciphered protocol data units (PDUs) received from a lower layer through at least one of a plurality of channels;  
means for buffering the deciphered PDUs; and  
means for converting the deciphered PDUs into service data units (SDUs), which are transmitted to an upper layer through an access point.

46. (Withdrawn) The device of claim 45, wherein the PDU-to-SDU converting means comprises:  
means for removing a header from a buffered PDU; and  
means for reassembling the header removed PDU to at least one SDU.

47. (Withdrawn) The device of claim 45, further comprising:  
means for buffering SDUs received from the upper layer through the access point;  
means for converting SDUs to PDUs; and



means for ciphering PDUs for transmission to a lower layer through at least one of the plurality of channels.

48. (Withdrawn) The device of claim 47, wherein the SDU-to-PDU converting means comprises:

means for segmenting and/or concatenating SDUs to form at least one PDU; and

means for adding a header to the segmented and/or concatenated SDUs to form the at least one PDU.

49. (Withdrawn) The device of claims 45 to 48, wherein the access point is a UM-SAP and at least one of the plurality of channels is at least one of DTCH, DCCH, CCCH, SHCCH, or CTCH.

50. (Withdrawn) The device of claim 45, wherein the buffering means further includes means for managing retransmission of the PDUs.

51. (Withdrawn) The device of claim 50, wherein the PDU-to-SDU converting means comprises:

means for removing header and/or extracting piggybacked information from the PDUs; and

means for reassembling the PDUs received from the removing means to SDUs.

52. (Withdrawn) The device of claim 51, further comprising:

means for converting SDUs from the upper layer via the access point to PDUs;  
a buffer for buffering the PDUs transmitted from the SDU-to-PDU converting means; and  
means for ciphering the PDUs for transmission to a lower layer through at least one of the plurality of channels.

53. (Withdrawn) The device of claim 52, wherein the SDU-to-PDU converting means comprises:

means for segmenting and/or concatenating SDUs to form at least one PDU;  
means for adding a header to the segmented and/or concatenated SDUs to form the at least one PDU;  
means for managing retransmission of the at least one PDU; and  
means for multiplexing output of the header means and managing means for output to the buffer.

54. (Withdrawn) The device of claim 53, wherein the ciphering means comprises:  
a field setting block for setting a field in the at least one header of the at least one PDU and/or setting piggybacked information to the at least one PDU; and  
a ciphering block for ciphering the segmented and/or concatenated SDUs of the at least one PDU based on the field set in the header.

55. (Withdrawn) The device of claim 54, further comprising:  
means for controlling the ciphering means; and

means for demux/routing status PDUs to the managing mean of the SDU-to-PDU converting means or data PDUs to the deciphering means.

56. (Withdrawn) The device of claim 54, wherein the ciphering block only ciphers segmented and/or concatenated SDUs of the data PDUs.

57. (Withdrawn) The device of claim 54, wherein  
the demux/routing means sends control PDUs to the controlling means; and  
header removing means sends ACK PDUs to the controlling means and  
piggybacked information to the managing means.

58. (Withdrawn) The device of claims 50 to 57, wherein the access point is an AM-SAP and at least one of the plurality of channels is at least one of DCCH and DTCH.

59. (Withdrawn) The device of claim 47 or 52, wherein the upper layer is an RRC and the lower layer is an MAC.

60. (Withdrawn) The transmitting device of a radio communication system of claim 1, wherein the at least one PDU comprises the at least one header and data, and the at least header includes a sequence number (SN) and an optional length indicator.

61. (Withdrawn) The transmitting device of a radio communication system of claim 60, wherein ciphering of the SN is excluded at the ciphering module.

62. (Withdrawn) The transmitting device of a radio communication system of claim 4, wherein the SN is not ciphered by the ciphering module.

63. (Previously Presented) The receiving device of a radio communication system of claim 11, wherein each ciphered PDU comprises a header and data and the header includes a sequence number and an optional length indicator.

64. (Previously Presented) The receiving device of a radio communication system of claim 63, wherein the sequence number is not ciphered and the data and the optional length indicator are ciphered.

65. (Withdrawn) The transmitting device of a radio communication system of claim 22, wherein the at least one PDU comprises the at least one header and data, and the at least header includes a sequence number (SN) and an optional length indicator.

66. (Withdrawn) The transmitting device of a radio communication system of claim 65, wherein ciphering of the SN is excluded at the ciphering module.

67. (Withdrawn) The transmitting device of a radio communication system of claim 25, wherein the SN is not ciphered by the ciphering module.

68. (Withdrawn) The method claim 32, wherein the at least one PDU comprises the at least one header and data, and the at least header includes a sequence number (SN) and an optional length indicator.

69. (Withdrawn) The method of claim 68, wherein ciphering of the SN is excluded

during the ciphering step.

70. (Previously Presented) The method of claim 38, wherein each ciphered PDU comprises a header and data and the header includes a sequence number and an optional length indicator.

71. (Previously Presented) The method of claim 70, wherein the sequence number is not ciphered and the data and the optional length indicator are ciphered.

72. (Previously Presented) The receiving device of a radio communication system of claim 11, further comprising a data retransmission module for controlling retransmission of data related to the PDUs to which the headers stored in the data storing module are added.